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| APPLICATION NO.                | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.  | CONFIRMATION NO. |
|--------------------------------|-------------|----------------------|----------------------|------------------|
| 10/724,817                     | 11/24/2003  | Lars Risbo           | TI-34411             | 2748             |
| 23494                          | 7590        | 05/03/2007           | EXAMINER             |                  |
| TEXAS INSTRUMENTS INCORPORATED |             |                      | GHULAMALI, QUTBUDDIN |                  |
| P O BOX 655474, M/S 3999       |             |                      | ART UNIT             | PAPER NUMBER     |
| DALLAS, TX 75265               |             |                      | 2611                 |                  |
| MAIL DATE                      |             | DELIVERY MODE        |                      |                  |
| 05/03/2007                     |             | PAPER                |                      |                  |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/724,817             | RISBO ET AL.        |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Qutub Ghulamali        | 2611                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 11/24/2003.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) 21-31 is/are allowed.
- 6) Claim(s) 1,13 and 14 is/are rejected.
- 7) Claim(s) 2-12, 15-20 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 11/24/03.
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 13, 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Hochschild (US Pub. 2004/0160348).

Regarding claim 1, Hochschild discloses a compensation system programmed and/or configured to mitigate errors in conversion comprising:  
a digital error model (page 3, section 0036) configured to provide an emulated error signal as a function of an function of an input signal that is quantized in a predetermined number of one or more levels, the digital error model having parameters (input signal each having a respective L values or levels) adaptively adjusted based on a signal of the conversion system to emulate (produce) error characteristics associated with at least a portion of the conversion system (A/D conversion system) (page 3, section 0036, 0037, 0038; page 4, section 0040).

Regarding claim 13, Hochschild discloses the DAC (206) coupled to receive the input signal that is quantized in the predetermined number of levels and to convert the input signal to a corresponding analog output signal, the error characteristics being error characteristics associated with the DAC (page 2, section 0025).

As per claim 14, Hochschild discloses

a noise and error shaping filter (module 202) that receives a digital signal (digital input 208) and provides a filtered digital signal (210) for conversion into the corresponding analog signal (216);

a quantizer (204) that provides a quantized signal (214) to the DAC (206) based on the filtered digital signal, the quantized signal defining the input signal to the DAC; and the digital error model providing the emulated error signal (the sigma-delta modulator 201 includes an input stage 202 (herein referred to as a sigma-delta core circuit), a variable quantizer 204, and a quantizer controller 218, the sigma-delta core circuit 202 receives a digital input signal over a line 208, and provides an intermediate digital output signal to the variable quantizer 204 over a line 210, the variable quantizer 204 provides its output directly to the internal DAC 206 over a line 214, and to the sigma-delta core 202 via a feedback path 212, the quantizer controller 218 receives the digital input signal over a line 222, in the preferred embodiment, the quantizer controller 218 further receives the state of one or more integrators (not shown) included in the sigma-delta core circuit 202 over a line 220. The quantizer controller 218 then provides its control output to the variable quantizer 204 over a line 224), to the noise and error shaping module as a function of the quantized signal (page 2, section 0025).

***Allowable Subject Matter***

3. Claims 21-31 allowed.
4. Claims 2-12, 15-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for indication of allowable subject matter. A search of prior art failed to teach, either alone or in obvious combination, a conversion system having a calibration system that adaptively programs parameters of the model during a calibration mode in which a calibration signal is provided to the conversion system, the calibration system adapting the parameters of model in the calibration mode to emulate error characteristics associated with at least a portion of the conversion system by adjusting parameters of the model to mitigate residual error in the output signal of the conversion system. Such limitations as recited in claims 21, 27 and 29 are neither anticipated nor rendered obvious by the prior art search. Claims 22-26, 28, 30-31 are allowed by virtue of their dependency to claims noted above.

***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patents:

US Patent (5,153,593) to Walden et al.

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US Patent (5,802,108) to Kao.

US Patent (5,061,925) to Sooch et al.

US Patent (6,11,795) to Cooper.

US Patent (4,296,412) to Mastner.

US Patent (5,101,205) to Yasuda.

Publications:

Erbar, M. Rieger, M. and H. Schemmann, "A 1.28-GHz sigma-delta modulator for video A/D conversion," in Proc. IEEE Int. Conf. Consumer Electron., 1996, pp. 78-79.

R. Schreier, M. V. Goodson, and B. Zhang, "An algorithm for computing convex positively invariant sets for delta-sigma modulators," IEEE Trans. Circuits System. I, vol. 44, pp. 38-44, Jan. 1997.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qutub Ghulamali whose telephone number is (571) 272-3014. The examiner can normally be reached on Monday-Friday, 7:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

QG.

April 26, 2007.

  
MOHAMMED GHAYOUR  
SUPERVISORY PATENT EXAMINER